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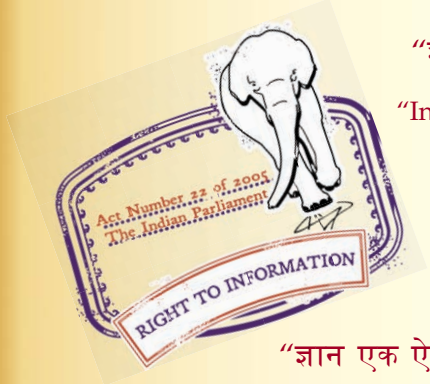
IS 5224 (1993): Oilseeds Milling Machinery - Oil Expellers Single Barrel [FAD 20: Agriculture and Food Processing Equipments]



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(Reaffirmed 1998)

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(दूसरा पुनरीक्षण)

Indian Standard

OILSEEDS MILLING MACHINERY — OIL EXPELLERS SINGLE BARREL — SPECIFICATION

(Second Revision)

UDC 665·1·05·061·34

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

August 1993

Price Group 3

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Agricultural Produce Milling Machinery Sectional Committee had been approved by the Food and Agriculture Division Council.

Oilseeds milling is one of the major industries in the country. The main machinery employed in the process of milling and extracting of oil from oilseeds consists of animal or power driven Ghanies, expellers and solvent extraction plants. Expellers are by far the most common machinery employed in extracting oil from various oilseeds like groundnut, linseed, mustard, and rapeseed.

IS 5224 'Specification for single barrel oil expeller' was published in the year 1969 and revised in the year 1978. This second revision has been brought out to cover more details single barrel oil expeller. In revising this standard the requirement as given in IS 10341 : 1982 'Recommended sizes and capacities for oil expellers (single chamber)' have been included in addition to the latest developments made in the field of oil expeller. This standard therefore supersedes IS 10341 : 1982. A list of Indian Standards which are of interest to the manufacturers of oil expellers is given at Annex A for guidance.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding of numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

OILSEEDS MILLING MACHINERY — OIL EXPELLERS SINGLE BARREL — SPECIFICATION

(Second Revision)

1 SCOPE

This standard specifies material, dimensions, performance and other requirements for single barrel oil expellers.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

For the purpose of this standard, definition given in IS 4596 : 1968 shall apply.

4 MATERIAL

4.1 The material of various components shall be as given in col 3 of Table 1. The material may conform to the relevant standard and grade given in col 4 and 5 respectively of Table 1.

5 HARDNESS

5.1 Cage Bars

These shall be case hardened to a hardness of 45 to 50 HRC (*see* IS 1586 : 1988) and the depth of hardening being minimum of 1 mm. The bars shall be oil quenched.

5.2 Worms and Collars

The worms and collars shall be case hardened to hardness of 50 to 60 HRC (*see* 1586 : 1988) and the depth of hardening being minimum of 1 mm.

6 PERFORMANCE REQUIREMENTS

6.1 Power Consumption

When tested in accordance with the method given in 9 of IS 5223 : 1993, the no-load power consumption shall be not more than 15 percent of the rated power of the expeller and visual observation during no load condition shall be free from the following:

a) Presence of any marked vibration during operation,

b) Presence of any under noise in the expeller,

c) Unusual heating of any component,

d) Any slippage of belts,

Table 1 Material of Construction of Various Components

(*Clause* 4.1)

Sl No.	Components	Material	IS No.	Grade
(1)	(2)	(3)	(4)	(5)
i)	Body	Cast iron	210 : 1978	20
		Mild steel	226 : 1975	—
ii)	Cage bar	Case hardening steel	4432 : 1988	All grade
iii)	Worms	Case hardening steel	4432 : 1988	All grade
iv)	Collar	Case hardening steel	4432 ; 1988	All grade
v)	Chamber plate	Mild steel	226 : 1975	All grade
			1079 : 1988	All grade
vi)	Frame bar	Carbon steel	1570 (Part 2/Sec 1) : 1979	C50, C55
vii)	Knife bar	Carbon steel	1570 (Part 2/Sec 1) : 1979	C50, C55
viii)	Shaft	Carbon steel	1570 (Part 2/Sec 1) : 1979	C40, C45, C50.
ix)	Clamping bar	Carbon steel	1570 (Part 2/Sec 1) : 1979	C30, C35
x)	Gears	Cast iron	210 : 1978	25
		Cast steel	1030 : 1989	All grade
		Forged steel	1875 : 1992	4,5
xi)	Pinions	Forged steel	1875 : 1992	4,5
xii)	Cone	Forged steel	1875 : 1992	4
		Carbon manganese steel	1578 (Part 3) : 1979	20 Mn 2, 27 Mn 2, 37 Mn 2

e) Non-smooth running of shafts in their respective bearings, and

f) Any marked unusual wear or slackness in any component.

6.2 Rated Capacity

When tested in accordance with **10** of IS 5223 : 1993, the rated capacity per kWh energy consumed with two stage milling shall be not less than 15 kg for groundnut kernels. During and after capacity test, the visual observation shall not indicate the following:

a) Observations given under 6·1(a) to (f), and

b) Leakage of oil and cake from the expeller.

6.3 Nominal Capacity

The nominal capacity of the expeller per hour shall be declared by the manufacturer. The capacity shall not differ by ±5 percent. The recommended capacities are 50, 100, 200 and 400 kg per hour.

6.4 When tested in accordance with **11** of IS 5223 : 1993, no breakdown defects shall develop in any unit of expeller.

7 RECOMMENDED DIMENSIONS

7.1 The recommended sizes of various components for various nominal capacities (*see* 6·3) are given in Table 2 for the guidance of manufacturer.

7.1.1 Tolerance for various dimensions shall be of coarse grade specified in IS 2102 (Part 1) : 1980.

8 CONSTRUCTIONAL REQUIREMENTS

8.1 The sheet used in construction of various components shall be of minimum 0·7 mm thickness.

8.2 A feed regulating and spreading system shall be provided.

8.3 Various controls shall be easily accessible and capable of being locked in a chosen position.

8.4 The gears shall be well balanced. The teeth of the mating gears shall match properly. They shall conform to Grade 12 of IS 4058 : 1967.

8.5 The keys in gear train shall be so fitted and secured that they cannot work loose.

8.6 All running shafts and wheels running on fixed axles or pins shall be fitted with ball, roller thrust or bush bearing and due allowance shall be made for impact and side thrusts, and where necessary spherical settings and spherical bearings shall be used.

8.6.1 Radial rolling bearings shall conform to the dimensions given in IS 5669 : 1987, thrust ball bearings to IS 5932 : 1970, wrapped bush bearings to IS 4757 : 1980 and sintered metal bearings to IS 3980 : 1982. Plain bearing shall, where practicable, be of the adjustable cap type. Provision shall be made for lubrication of all movable parts and bearings while the expeller is in service except where prelubricated bearings are used. Ball and roller bearings shall be lubricated before assembly. Lubricating nipples and adapters shall be easily accessible. All exposed bearings shall be suitably sealed or shielded. The other requirements of the self-aligning roller bearings should conform to IS 6454 : 1972 and that of single row radial ball bearings to IS 6456 : 1972 and that of double row radial ball bearings to IS 6456 : 1972.

8.7 In case of belt drive, provision shall be made of belt tightening and V belt shall be in accordance with IS 2494 : 1974.

8.8 Transmission guards shall be provided to prevent accidental contact of persons or parts of clothing being caught in the transmission system, unless the system is so constructed or placed as to be safe without guards.

8.8.1 The guards shall be so designed as not to hinder in easy adjustment, servicing and operation of expeller.

8.8.2 It is preferable that all guards shall be either permanently attached or firmly secured to prevent their removal without the aid of the tools. The servicing and adjustments should be possible without complete removal of the guards.

8.8.3 The guards shall have sufficient strength to support load of 1 200 N applied at any point over an area of 0·1 m^2 without permanent set.

NOTE — Depending upon the space available, area and load may be correspondingly increased or decreased for testing purpose.

9 OTHER REQUIREMENTS

9.1 Each expeller shall be provided with instructions sheets containing full information of methods of installation and operation in form of operator's manual. The manual may be on the lines given in IS 8132 : 1969.

9.2 Welding used for joining different components shall not be porous and shall be smooth (*see* IS 816 : 1969).

9.3 Any sharp corners and protruding fasterners shall be avoided.

9.4 Components of the expellers shall be finished smooth and properly painted after applying suitable primer.

Table 2 Recommended Sizes of Various Components
(*Clause* 7.1)

Sl No.	Particulars		Expellers with Capacities/Day			
			50 kg	100 kg	200 kg	400 kg
(1)	(2)		(3)	(4)	(5)	(6)
i)	General revolution of main worm, rpm		30-35	20-30	15-25	8-15
ii)	Chamber of expellers:					
	a) Length of chamber, mm		610	686	763	849
	b) Bore of chamber without cage bar, mm		138	163	178	216
	c) Bore of chamber with cage bar, mm		100	125	140	178
	d) Number of chamber plates		14	20	20	20
	e) Thickness of chamber plates, mm		18	22	25	32
	f) Size (Length × Height × Thickness) of cage bars, mm Number of cage bars					
	Plain	Size	196·8 × 19 × 6·38	222 × 19 × 9·5	247·6 × 19 × 9·5	276·2 × 19× 12·7
		No.	108	72	96	96
	Side	Size	196·8 × [illegible] × 9·5	222 × 19 × 9·5	247·6 × 19 × 9·5	276·2 × 19 × 9·5
		No.	[illegible]	12	12	12
	Taper	Size	[illegible]	222 × 19 × 9 to 6	247·6 × 19 9 to 6	276·2 × 19 × 9 to 6
		No.	—	12	12	12
	Centre	Size	196·8 × 19 × 19	222 × 19 × 19	247·6 × 19 × 19	276·2 × 19 × 19
		No.	6	6	6	6
	Spacing plane bar	Size	—	222 × 19 × 6·35	247·6 × 19 × 6·35	276·2 × 19 × 6·35
		No.	—	12	12	12
	g) Chamber bolts, mm		25	32	32	40
	h) Clamp bars, mm		50	63	63	75
iii)	Gear section:					
	a) Main gear and pinion 8 M:					
	No. of teeth gear/pinion		60/12	74/15	74/15	91/16
	OD mm gear/pinion		520/120	608/136	608/136	744/144
	Pitch circle diameter mm gear/pinion		504/104	592/120	592/120	728/128
	Centre distance, mm		304	356	356	428
	b) Quill worm gear and pinion 8 M:					
	No. of teeth gear/pinion		Nil	Nil	64/25	85/22
	OD mm gear/pinion		Single gear train	Single gear train	528/216	696/192
	Pitch circle diameter mm gear/pinion		—	—	512/200	680/176
	Central distance, mm		—	—	356	428
iv)	Kettle					
	a) Round cooking kettle or cooking trough		—	Trough type	Trough type	Round type
	b) Heating area, m^2		—	1·0	2·0	4·0
	c) Steam pressure, MPa		—	1·7 to 3·1	2·4 to 3·1	6·9 to 10·4
	d) Consummation of steam kg/h		—	25	30	50

10. MARKING AND PACKING

10.1 Marking

Each expeller shall be marked with the following particulars:

a) Indication of source of manufacturer;

b) Model number;

c) Batch, code or serial number;

d) Nominal capacity; and

e) Power rating.

NOTE — Various adjustments, clearances and speeds for rated capacity along with cooking time and temperature shall be declared by the manfacturer.

10.1.1 Each oil expeller may be marked with Standard Mark.

10.2 Packing

The expeller or its components shall be packed as agreed to between the purchaser and the supplier for the safe handling in transit and storage.

ANNEX A
(*Foreword*)

LIST OF SOME OF LINKED INDIAN STANDARDS

IS No.	*Title*	*IS No.*	*Title*
2048 : 1983	Parallel keys and keyways (*second revision*)	4059 : 1967	Accuracy requirements for medium quality medium speed gears
2291 : 1990	Tangential keys and keyways (*third revision*)	4460 : 1967	Method for rating of machine cut spur and helical gears
2292 : 1974	Taper keys and keyways (*first revision*)	4672 : 1982	Grease cups (*first revision*)
2293 : 1974	Gib-head keys and keyways (*first revision*)	5019 : 1968	Lubricating plugs
2294 : 1986	Woodruff keys and keyways (*second revision*)	5037 : 1969	Basic rack and modules of straight bevel gears
2327 : 1963	Dimensions for straight-sided splines for general engineering use	5375 : 1979	Data for procurement of cylindrical gears (*first revision*)
2535 : 1978	Basic rack and modules of cylindrical gears for general engineering and heavy engineering (*second revision*)	5548 : 1970	Lubricating nipple adaptors
		6166 : 1971	Thin taper keys and keyways
3665 : 1966	Dimensions for involute sided splines	6167 : 1971	Thin parallel keys and keyways
3681 : 1966	General plan for spur and helical gears	6535 : 1979	Data for procurement of cylindrical bevel (*first revision*)
3734 : 1983	Dimensions for worm gearings (*first revision*)	7443 : 1974	Methods for load rating of worm gears
4009 (Part 1) : 1981	Button head grease nipple (*first revision*)	7504 : 1974	Methods of inspection of spur and helical gears
4009 (Part 2) : 1981	Conical head grease nipple (*first revision*)		

ANNEX B
(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
210 : 1978	Grey iron castings (*third revision*)
226 : 1975	Structural steel (standard quality) (*fifth revision*)
816 : 1969	Code of practice for use of metal arc welding for general construction in mild steel (*first revision*)
1030 : 1989	Carbon steel castings for general engineering purposes (*fourth revision*)
1079 : 1988	Hot rolled carbon steel sheets and strips (*fourth revision*)
1570 (Part 2/ Sec 1) : 1979	Schedules for wrought steels: Part 2 Carbon steel (unalloyed steels), Section 1 Wrought products (other than wire) with specified chemical composition and related properties (*first revision*)
1570 (Part 3) : 1979	Schedules for wrought steels: Part 3 Carbon and carbon-manganese free cutting steels (*first revision*)
1586 : 1968	Method for rockwell hardness test (for metallic material (scales A-B-C-D-E-F-G-H-K) (*second revision*)
1875 : 1992	Carbon steel billets, blooms, slabs and bars for forgings (*fifth revision*)
2102 (Part 1) : 1980	General tolerances for dimensions and form and position: Part 1 General tolerances for linear and angular dimensions (*second revision*)
2494 : 1974	V-belts for industrial purposes (*first revision*)
3980 : 1982	Porous metal powder oil-impregnated bearings (*first revision*)
4058 : 1967	Accuracy requirements for coarse quality low speed gears
4432 : 1988	Case hardening steels (*first revision*)
4596 : 1968	Glossary of terms relating to oil expellers
4757 : 1980	Wrapped bushes
5223 : 1993	Methods of test for evaluation of performance of oil expellers (*first revision*)
5669 : 1987	General plan of boundary dimensions for radial rolling bearings (*first revision*)
5932 : 1970	Boundary dimensions for thrust ball bearings with flat seats
6454 : 1972	Self-aligning roller bearings
6455 : 1972	Single row radial ball bearing
6456 : 1972	Double row radial ball bearings
8132 : 1993	Guidelines for presentation of operator manuals and technical publications for agricultural tractors and machinery (*first revision*)

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

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